Incorporating 21st century skills and knowledge management into Japanese Management and Organizational Culture in Schools : Towards 21st century skills 2.0 Tohoku can offer after 2011

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21st century skills in primary and secondary education in Japan consist of the following complex elements, as it were, five multi-layer loops with uncertain layers. Japan is focusing on the whole child education by merging its traditional way of learning through first and second loops with the 21st century required skills through third, fourth, and fifth loops. The first loop is self-learning skills supported by honesty, self-reflection, and improvement in the Japanese language; The second loop, the Japanese-style basics (3Rs plus), is supported by the good points of Japanese-style management: emphasis on internal harmony, utilization of the "bottom-up" process of decision-making. Although the gap between social innovation and schooling continues to widen, knowledge creation metaphors are necessary for school learning, in addition to knowledge acquisition and participation metaphors. Focusing on the individual and responding to individual differences has undergone a transformation over the past quarter century. With empathy as the key, Japanese-style educational management will be reintegrated within SECI (socialization, externalization, combination, and internalization) model and reframed in “a dual-purpose in a multi-layered way with multiple feedback” framework, from closed (principle of) self-sufficiency (*Jimae-shugi*) to open innovation and spontaneity which relate to curiosity as Personality Traits. And during this period assessment and testing theories will be examined.

Keyword : 21st century skills, Interpersonal Competence by Japanese language, constructivist assessment, Japanese organizational culture, School research theme as a symbol of kata culture

1 Introduction

Although Japan's 21st century skills have continued to be used only as "ikiru chikara (zest for living)" we have not been able to disseminate the information in a way that unravels the concept overseas. Why is this? In my opinion, it is because we live in a complex society, and interpersonal competence in particular is "natural" in terms of cultural awareness and awareness of one's own culture. When we look back at this "normality," we can see that it has been unknowingly continued through the layers and educational trends of the times, which could be called osmosis, and that understanding it requires a considerable detour and detour through the key concept of Japanese culture, which is fusion. Much of it comes from the Japanese language, and much of it is practice-driven, with the complexity of perception, learning, and feedback, as well as the complexity of the individual coming from social contexts. Self-management including self-solicitation of feedback, and skill development are related to personality traits and the culture. In Japan, which has been known as "contextualized person" since the 1970s, the Japanese aesthetic sense of suggestibility, irregularity, simplicity, and transience, in a culture of compassion and bonds, has led to the development of the four immeasurable aspects of life, immeasurables (Four Immeasurable Minds, our consciousness by not limiting it within the boundaries of our personal selves) that are everywhere in society.

As a matter of fact, after 1995, the literature on Japanese-style management seems to have disappeared, and its characteristics seem to have been replaced by a focus on collective efficacy. However, I will argue that intrinsic knowledge creation, by visualizing empathy and other cultural scripts for improvement as a social culture based on the Japanese view of the world and humanity, and tacit knowledge and educational management are sufficiently appealing to the world by refining the methodology of both assessment and 21st century skills (Arimoto et al 2017, 2020). This paper argues that tacit knowledge and educational management can be applied to the world.

Alternative assessment is considered as feedback and cybernetics. For more than 30 years, debates about the bi-polarity of formative and summative assessment have served as surrogates for discussions about the workings of the mind, the social implications of assessment and, as important, the role of instruction in the advancement of learning. Currently, alternative assessment lives uneasily with its classical counterpart. Classical test theory--and its conception of the summative value of the true score --came from behaviourist learning theories developed in

the first three decades of the twentieth century. Formative assessment, with its conceptions of feedback and development, had a different origin. It arose from cognitive and constructivist theories of learning that emerged in the 1930s and 1940s. the tensions are identified that underpin this uneasy coexistence. It suggests that different conceptions of mind lie behind these tensions and, to mark the autonomy and integrity of formative assessment, it offers an alternative, univalent descriptor: "constructivist assessment" (Roos & Hamilton, 2005). Based on the social culture of Japan, this paper exposes how the educational trends from the 1980s have become the prototype for the organizational culture of schools, moving from the formative evaluation that flourished at that time to the complexity of formative assessment as a school. The idea of a neopragmatic postmodernist test theory is discussed and some thoughts are offered about what changing notions concerning the nature of and meanings assigned to knowledge imply for educational assessment, present and future with advances in the learning sciences--particularly situative and sociocognitive stances--call into question the adequacy of the trait and behaviorist psychological perspectives under which educational measurement evolved (Mislevy, 2014).

Regarding authorized textbook approved by the Ministry of Education, audiovisual education, and school architecture etc., they have their own contexts in Japan[1)].

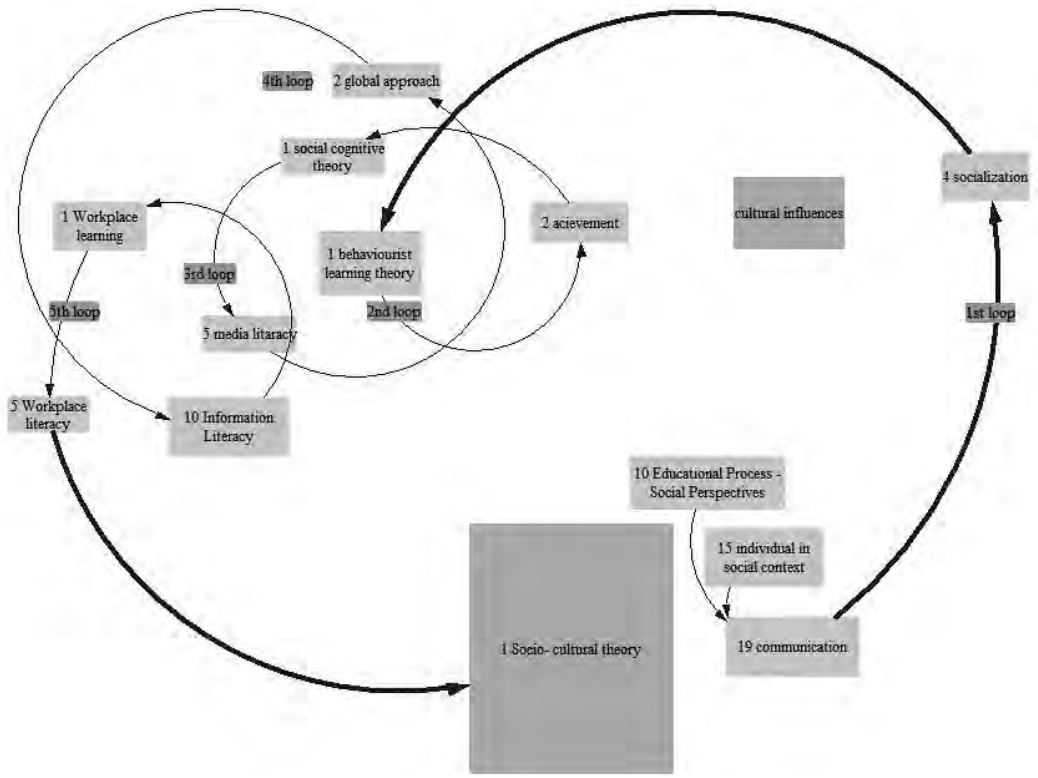

Figure 1: Five Multi-Layer Loops with uncertain layers
(Numbering 1, 2, 4, 5, 10, 13, 19 is based on doors 20 see: Arimoto et al 2020)

2 The First Loop and Spiral - Communication and Socialization

As a prerequisite of proposing Japanese-like 21st century skills, the following is important.

Factors such as early child rearing, socialization, discipline, and the effects of mothering and culture on personality and communication determine behavior in schools. The preschool places an emphasis on group consciousness, and strives to avoid conflict. It teaches the distinctions between home and family on the one hand and school and the society on the other.

In terms of early child rearing, beliefs and values about child rearing are discussed from documents written by experts in the mid-17th to mid-19th centuries. The experts argued that children are innately good rather than evil; environmental factors accounted for differences among children rather than innate factors; and children were autonomous rather than passive learners. (Kojima, 1986). Children are considered inherently good. They are allowed to settle their own conflicts. They play a large part in school maintenance, frequently serving lunch and cleaning. A key in early childhood development is *amae*, or dependence. The concept of *amae*, or dependence, is transferred from home to the school when teachers become involved with students' home and after school care. And this concept is later transferred to group loyalty. Persistence is an important attribute for success in school, as in the idea of *kaizen*, or constant striving for improvement. Attributes shaped by societal expectations affect communication in all aspects of the educational process. (Pike, 2007, p.1).

And such attributes, societal expectations, communication, aspects, educational process are what Japanese educational system supports to build qualified generations that fulfill 21st century requirements.

The following is about the relation between curriculum and cognition. The IQ and cognitive abilities of Japanese students are discussed in an effort to ascertain why these students attain such high scores on intelligence, science, and mathematics tests. Social and cultural factors may be involved. It has been speculated that there is an affinity between the nature of the Japanese language and the ability to grasp mathematical symbols. Comparisons between textbooks in the US and Japan show vast differences. Japanese mathematics textbooks are small but concise, leaving room for more lesson elaboration by teachers. Lesson Study, which involves peer observation and criticism, is an example of one aspect of Japanese teacher training. Japanese teachers leave classroom management and discipline problems more to the students and their peers. Elementary level learning groups (*han*) are led by a student leader (*hancho*). The nationally prescribed curriculum in Japan, with the overseeing of textbooks, allows for less freedom and more similarity of teaching methods. Local variations are more the norm in the US. Current educational reforms have prescribed a more relaxed subject curriculum with more freedom of choice for Japanese students. (Pike 2007, p. 234)

In terms of socialization, the aspects of the socialization process that most affect the daily lives of adolescents and how parental attitudes are related to these aspects were studied. Differences in socializing contexts, adolescents' use of time, and parental attitudes are discussed. Japanese children are socialized to internalize parental, group, and institutional norms. The Japanese curriculum included more classes in non-academic subjects. The Extra curricular time in Japan (*Tokkatsu*) was used for breaks, lunch, cleaning, school events, television, and reading comics. Japanese parents view the school as trying to develop the whole person. Japanese parents saw supplementary education as indispensable. Japanese students engaged in activities related to school. (Toyama-Bialke, 1998).

In terms of culture, the existed cultural influences affect socialization indirectly. The understanding of group behavior and needs of other children contributes to children's sharing of responsibility and positive learning attitudes (Whitburn 2003). Taking *sunao* as an example, it is shown how Japanese adults promote *sunao* and how they consider sunao to be related to children's autonomy. (Izumi-Taylor, 2008). Japanese adults believe "good" children to be *sunao* (cooperative). *Sunao* is difficult to translate into English, but can be thought of as being gentle and spirited. (Enloe & Lewin 1987). Groups play an important part in the lives of Japanese citizens. Interpersonal relations and harmony are the source of group strength. A comparison of group life in the United States and Japan indicates that, generally, Japanese work for their group's good, while Americans work for their personal good (Zander 1983). This paper presents a study that examined and described feelings and thoughts of Japanese children, their parents, and their teachers about *sunao* in a school setting. The kindergarten selected for this study was located in Kawasaki city, a middle class suburb near Tokyo. It was a traditional Japanese kindergarten and as such involved considerable group work. Children worked together on projects. At times the classes seemed to represent a single entity rather than a collection of individuals. The following themes emerged from analysis of the data: (1) *sunao* as a fundamental characteristic of the child; (2) *sunao* as both a positive and negative concept depending upon the use; and (3) *sunao* as a result of how the child is treated by others. *sunao* is defined as honesty. *sunao is* considered to be a part of the whole child who is able to keep interpersonal harmony within a group situation. *Sunao* as behavior also can be seen two ways: being sunao to one's self and being *sunao* to others. The paper reports that *sunao* is one of the fundamental characteristics of the child: it affects their very being; how they behave and what they feel. Adults try to foster *sunao* through communication, modeling, and praise. (Taylor et al., 1994). The Japanese concepts of "*sunao*," a quality of docility or cooperativeness in kindergarten children is examined from how Japanese adults promote their children's internalization of parental, group, and institutional norms. The role of "*sunao*" is discussed as a fundamental characteristic of the child, and its relation to the child's

autonomy and peer relations. (Taylor et al., 1998). Also it is discussed that the Japanese cultural concept of *sunao* (perhaps best translated as one's honest, gentle, cooperative nature) in relation to early childhood education in Japan. The cultural belief that during early childhood, children need to learn to connect with one another and build a willingness and capacity to live harmoniously in a group.

Another example is "*hansei*". The concept of "*hansei*" (introspection) is examined among teachers, parents, and other relatives of Japanese kindergarteners (Taylor et al 2005). The data came from essays written by Japanese adults. The data analysis revealed that the concept of "*hansei*" encompassed self-evaluation, improvement, and morality. The implications for education and teacher education resulting from the study were presented (Taylor et al., 2005). Helping children to refine and coordinate old ways of thinking is based on constructivist teaching, which promotes children's introspection skills. Several Japanese early childhood teaching practices align with constructivism, and teachers reflect on their teaching methods and on their assessment of children by focusing on children's everyday life experiences. Japanese teachers also encourage preschoolers to be introspective. The Japanese word for introspection is "*hansei*," a cultural learning theory considered to be a fundamental skill that contributes to social and personal development. It is a tool used to raise Japanese children's standards of behavior or action, both at home and at school. Because Japanese people strive to avoid criticism by others, monitoring one's behavior is a necessity. *Hansei* is interpreted as reviewing past behavior, evaluating and critiquing it, and finally improving upon it. *Hansei* is very common in Japan, and it is familiar to all Japanese except the very young. How Japanese preschool children learn to be introspective is described, with teachers' support. Japanese teachers' teaching strategies are based on their beliefs that children are autonomous beings capable of self-regulation, with teachers' help. (Izumi-Taylor, 2009). The reciprocity of prosocial behavior is investigated among Japanese preschool children during free-play time. Young children reciprocate prosocial behavior spontaneously. Friends reciprocated object offerings more frequently than non-friends, suggesting that friendship affects the quantitative aspect of reciprocity. Reciprocity among children becomes more complicated as children grow older. (Fujisawa, et al., 2008). This doesn't indicate that hansei decreases reciprocity.

Central issues are explored in studies of Japanese culture, the Japanese sense of self, and the Japanese family, including *amae* (mother-child dependency relationship), *gambare* (perseverance), and *gaman* (endurance). (Adler, 1998)

Moral education is connected to academic education. The concepts of *kaizen*, or continuous self-improvement *ganbare*, or persistence and perseverance, and group cooperation dominate the philosophy of Japanese students from elementary grades through college. The incorporation of

the Lean Philosophy in PCMS will be carried out through *Kaizen*. "*Kaizen*" is a Japanese word which means "change for better". It is a step wise process which is carried out with the involvement of all the skills and stakeholders. So, for PCMS advancements, it involves all the skill and stakeholders which are related to PCMS. Following is the summary of the *Kaizen:* (Patty and Denton 2010b). Preparation for *Kaizen* involves identifying work process problems, or opportunity to improve; measurement and estimating the value of closing the gap between what is and what should be. Teams should summarize their findings in 'situations-at-a glance' and identify skill and stakeholders, principles and methods for solution development and implementation A *Kaizen* is a workshop, to develop the solution of the work process problem with the involvement of all the skills and stakeholders, and the application of rapid improvement principles and methods. Once solutions are developed, *Kaizen* teams validate and refine the solution through trystorming and Piloting. If the desired solution is not achieved, the process is repeated again and again until the desired best solution is achieved and standardized. After successful piloting these improvements are built into company standards, management by standards must be embedded in the culture and governance of the organization. Teachers are expected to be involved in the after-school life of their students. Self-loyalty and self-development must be connected to group loyalty. ..In spite of many strides that have been made, bias still exists against women in higher education and in the workplace. Women's roles in society are seen primarily as mothers (*kyoiku* mamas) and wives. (Pike, 2007, p.57).

It is suggested that perceptions of the self, of others, and of the relationship between self and others are very powerful and that this influence is clearly reflected in culture. The independent view of the self, represented in Western culture, is contrasted with the interdependent view in many other cultures. (Markus & Kitayama, 1991).

The independent view of the self elaborates on the basic thesis developed by Rothbaum et al., underscoring the significance of the co-constructive process of the self and social relationship. Implications are discussed for future cultural psychological inquiry in this area. (Kitayama, 2000).

When the compensatory investigation of self-enhancement was held between Japanese and Canadian college students, who completed and graded the Remote Associations Test under success of failure conditions, then completed a questionnaire containing a compensatory self-enhancement measure. (It was observed that) Canadian students discounted negative feedback, though they did not exhibit compensatory self-enhancing responses. (On the contrary,) Japanese students were highly responsive to failure feedback and showed evidence of reverse compensatory self-enhancement. (Heine, Kitayama, et al., 2001).

The study of culture and self casts psychology's understanding of the self, identity, or agency as central to the analysis and interpretation of behavior and demonstrates that cultures and

selves define and build upon each other in an ongoing cycle of mutual constitution. In a selective review of theoretical and empirical work, we define self and what the self does, define culture and how it constitutes the self (and vice versa), define independence and interdependence and determine how they shape psychological functioning, and examine the continuing challenges and controversies in the study of culture and self. We propose that a self is the "me" at the center of experience-a continually developing sense of awareness and agency that guides actions and takes shape as the individual, both brain and body, becomes attuned to various environments. Selves incorporate the patterning of their various environments and thus confer particular and culture-specific form and function to the psychological processes they organize (e.g., attention, perception, cognition, emotion, motivation, interpersonal relationship, group). In turn, as selves engage with their sociocultural contexts, they reinforce and sometimes change the ideas, practices, and institutions of these environments. (Markus & Kitayama, 2010).

From the perspective of language socialization, the use of addressee honorifics (the "*masu*" form) and their non-honorific counterpart (the plain form) are examined at home and in classroom interactions at elementary schools in Japan Both at home and school the "*masu*" and plain forms are used as indices of the mode of self. (Burdelski, 2013). Also socialization of honorifics in Japanese is examined. Ways caregivers use referent and addressee honorifics within role-play activities as an index of social roles linked to a public self, and ways they use addressee honorifics within ordinary interaction as an index of affective stance in social actions such as directives. It also shows ways children use addressee honorifics within role-plays as an index of social roles, and ways they use addressee honorifics within ordinary interaction as an index of affective stance in social actions such as objections. While children learn the central meaning of addressee honorifics as a display of a public self, they also pick up on the affective meanings of honorifics in caregiver speech and deploy them in interaction with peers in creative ways (Cook, 1996).

Somesthesis (Jap *taiseikankaku*: the faculty of bodily perception; sensory systems associated with the body; includes skin senses and proprioception and the internal organs) is the point of departure. for reciprocity with hansei introspection (Ben-Ari,1997). There is a saying in Japan, “if one lights a fire for others, one will brighten one’s own way.” So holistic cultural view of Japanese is discussed as the concept of “Japanese collectivism” (Azuma, 1998).

On the above prerequisites, as children participate in documentation activities, they put their self-regulated learning and metacognition into practice (Clark, 2012).

3 Second Loop and Spiral - Problem solving and the Classroom Masagement, supported by Japanese management until the 80s

We notice that in the 80s there were lots of practices for developing basic skills while

teaching about Japan at the secondary level as well as primary level (Arimoto, 2018, 2019). Some researchers have even suggested that the superiority of Japanese students in international comparisons of achievement in mathematics operations and problem solving may be due to the widespread use in Japan of instructional practices similar to mastery learning (Waddington 1995). Shows how although students work in groups of 6 or 7 and take on responsibilities as a group, students' individualism is not suppressed. Describes the teacher's goals of developing students' thinking skills, ability to express ideas, and commitment to development of heart and body. (Johnston& Kotabe 2002). The homeroom teacher in middle school is responsible for "checking" the student's personality to see if the student's desires and family circumstances are in balance. If these two are not smoothly aligned, the teachers feel it will be very difficult to adequately motivate the students during the final year of study (LeTendre 1993). (Hantula, 1986).

These self-contained practices of developing basic skills are practiced in schools over time to foster critical thinking in students, to truly develop children into independent thinkers in the real world, and to make critical and creative thinking the backbone of children's lifelong learning power.

Although Japanese society has long valued and practiced lifelong learning, it has not yet been successful in building an ethic that prizes learning, teaches creativity, and includes everyone. Bureaucratic and legal mechanisms undertaken in Japan to promote lifelong learning have included the establishment of Lifelong Learning Councils, a system for implementing local measures; liaisons and cooperation schemes for municipalities and prefectures; and criteria for delivering and assessing learning programs and needs. Many local governments have also subsidized "model projects" that promote lifelong learning. Despite these fiscal investments, problems of local implementation, coordination between private and public sectors, reorganization of non-formal education, and lack of administration exist. To foster lifelong learning, elementary and secondary curricula have been reformed to emphasize problem-solving and independent thinking skills, as well as cultivate children's individual needs. However, attempts to reduce school hours to help students learn more with their families have largely failed due to double schooling, or participation in cram schools. Though parents disapprove of these schools, intense competition leaves no room for lax attitudes. As a result, behavioral problems such as truancy and bullying have arisen. The ideal educational system would foster a "zest for living" in an atmosphere where children can achieve "peace of mind," working to eliminate borders between formal and non-formal education. (Sawano, 1997). And the realization of an ideal educational system requires, first and foremost, the cooperation of the management organization.

There are four prominent features of the Japanese approach to management – (1) emphasis on internal harmony, (2) utilization of the “bottom-up” process of decision-making, (3) general

availability of managers, and (4) utilization of a permanent employment system – and such features are attempted to explain how they tend to influence the quality of communication within the Japanese organization (Hirokawa, 1981).

The quality of communication within the Japanese organization discusses the Japanese management system, particularly the Theory Z emphasis on employee incentives, cooperation, trust, and focus on people. Organizational scholars have consistently noted that organizations in Japan generally possess more effective systems of communication than U.S. firms. How the Japanese approach to management encourages and facilitates the exchange of information between organizational members are described. (Hirokawa, 1981)

Homeroom teachers are responsible for every aspect of the student's total education. That is to say these teachers are not only responsible for seeing that each of the forty to forty-five students in their charge becomes academically competent, but also that each student is socially well-rounded--able to function well as a member of the class and, therefore, presumably ready to function as a member of the next level of society upon graduation (for example, high school, college or university, a company). In other words, the homeroom teacher must see the student on not merely to the end of the current track of education, but through to the next level. Indeed, there may seem to be some confusion as to where the responsibility of the homeroom teacher ends and that of the parents comes into play. But in Japan, parents are usually quite willing to divide and share these responsibilities with the homeroom teacher (Rhodes 1994).

The classroom use of the Japanese quality circle concept of consensus and group management has been received in the US. (Hirshfield, 1983). Reviews the American adaptation called "quality circles" and "team management" and shows how synergistic management techniques can be applied to building- and district-level school management. The whole object of Quality Circles is “staff involvement, people development, and the generation of tangible benefits.” (Jones & Villines, 1987). Behind the staff involvement, we should note Japan's communal approach to teacher induction: Shokuin shitsu as an indispensable nurturing ground for Japanese beginning teachers (Ahn et al 2018; Ahn 2016; Ahn 2014).

The successful program was implemented at Lawrence North High School in Indianapolis (Indiana) for increasing the participation of parents, students, and teachers in school governance from the Japanese model of management. With shared decision making came a new sense of ownership and involvement on the part of parents and students as well as professional staff. The model of synergistic management (win/win decisions produced) identifies new roles performed by teachers, administrators, parents, and students and notes two dramatic results of the program's first year (Phillips & McColly, 1982).

Regarding Japanese management, Peter Drucker discusses current issues in education such

as teacher development and encouragement of alternative methods of learning/teaching. (Ellner, 1976). Aquila reviewed Japanese management concepts including worker involvement, situational management, individual selection of workers, lifetime employment, and the quality circle. 10 applications of such concepts to educational administration are suggested but urges caution and recognition of the interrelationships existing among all management techniques employed. The Way of the Hula Hoop metaphor can be applied to relationships, careers, mental health and wellness, parenting, starting a side hustle, exercise and fitness… you name it. Because the hula hoop is a perfect metaphor for life. (Aquila, 1982). He also presented a series of approaches suggested by Japanese business management successes and suggested ways several tenets of the Japanese system can be used in American school management including Administrator Role, Teacher Administrator Relationship. (Aquila, 1983). Supported by such cultural contexts, problem-solving is moving from cooperation (in well-structured problem-solving) towards collaboration (in ill-structured problem-solving) (Becker & Miwa, 1987; Fujita,et al., 2021). During this period, the matter of Individual differences　was pursued (Stevenson, et al 1998). [2)]

4 Third Loop and Spiral - Media Education and the Classroom Process

The 1980s were the first year of computers, and audiovisual equipment was expected to supplement the Courses of Study, which were regarded as guidelines for textbooks, and to change the role of teachers. The movement up to 2000 was as follows.

The Ad Hoc Council on Educational Reform pointed out in 1987 that Japanese education must prepare for the ever-increasing information needs of the future, and in 1988, a proposal for the development of information networks was published by the Ministry of Education, Science, and Culture. This proposal recommended the utilization of a wide range of media in support of lifelong learning activities and the establishment of such systems in various localities (Japan Audio-Visual Education Association 1989). There was also a need to improve the social education institutions, including public halls, libraries, museums, children's centers, youth houses, children's culture centers, and women's educational centers (Japan Audio-Visual Education Association, 1987).

In the 80s in Japan, the non-cognitive characteristics we were to consider included self-concept, locus of control, perseverance. The proposed list of behavioral characteristics included coping behaviors, task orientation, group functioning, productivity, motivation, and creativity (Leestma, Bennett et al., 1987, p. 83; Japanese management from the perspective of the complex relationship between Japanese culture and their practice of lifelong employment, shared authority in decision making, and dissolution of many of the privileges of rank is discussed (Dillon 1984)).

People expect media education to play a role in this, so some attempts have been made. For

example, a closed circuit video system combined with overhead projectors was used to increase student motivation in a junior high school. In another example, films, radio, television, slides, and videotaped materials were used in a series of community-based educational programs designed for citizens of all ages, offering "localization" of school, social, and adult education have been recognized by the Japan Audiovisual Education Association for the effort. (Japan Audio-Visual Education Association, 1989).

Today, with the aim of improving academic achievement, and stimulated by the PISA survey, people are aware of the Courses of Study including Communication Skills, Media Literacy (The ability to communicate competently in all media forms, print and electronic, as well as to access, understand, analyze and evaluate the images, words, and sounds that make up mass media messages) . Do attempts to accommodate the complexity of the digital artefact by devising terms that synthesize the range of literacy processes involved in human-computer interaction deter us from attending to the distinctiveness of those processes? Taking up this question by considering how notions of reading and writing have been construed in relation to digital media, and whether such notions are in fact useful in furthering understanding of digital literacy. (Dobson, 2007).

5 Fourth Loop and Spiral - Global Approaches and Curriculum Organization (school-based ESD curriculum Consortium)

A reform of public education in Japan took place from the 1980s, coming to a de facto end in 2013. The reform, which affected large numbers of Japanese children, focused on creating a more flexible, relaxed form of education by reducing the amount included in the curriculum (Takeuchi, 2019). In the 1990s, decentralized education for international understanding was at the forefront. This foreshadowing has been followed today by the rise of the Global Approach - Super English Language High School: SELHi (2002~), Super Global High School: SGH (2014~), Worldwide Learning Consortium: WWL (2019-) which incorporates network beyond each local governance. Sparked by the confluence of accelerating domestic transformation and increasingly explicit impacts from "globalization", the Japanese education system has undergone tremendous changes during the turbulence of the past decade. The "reimagining" thus restores Japan to its place as a key comparative link in the global conversation on education and lays out new pathways for comparative research and reflection. (Willis & Rappleye, 2011).

According to Yoshizumi and Miyaguchi, Various approaches have been advocated and practiced to address sustainable development. Among these, education has been recognized as one of the key measures to achieving sustainability. (Yoshizumi & Miyaguchi, 2005) Education for Sustainable Development (ESD) requires learner-centred and interactive teaching strategies such

as critical thinking, participatory decision-making, value-based learning, and multi-method approaches, all of which to some degree contrast traditional lecture-based teaching practices. (Ichinose, 2017) Since its establishment in 2003, the Japan Council on the UN Decade of Education for Sustainable Development (ESD-J) has paid close attention to informal learning processes in community-based efforts to promote local sustainable development. (Noguchi, 2010) The UNESCO World Conference on Education for Sustainable Development (ESD) has been co-organised in 2014 by UNESCO and the Government of Japan on the occasion of the end of the UN Decade of Education for Sustainable Development. ("UNESCO World Conference on Education for Sustainable Development: Learning Today for a Sustainable Future," 2012)

In Japan, environmental education partnerships among citizens, businesses and local government increased since new legislation was introduced in 2003, but there was little evidence of cross-sector collaboration until recently. (Chikami, & Sobue, 2008) The example of Okayama could be a good example to explain this cross-sector collaboration. The Okayama Education for Sustainable Development (ESD) Project is an ongoing initiative in Okayama City, Japan, established in 2005 by the Regional Centre of Expertise (RCE) Okayama and the Okayama Municipal Government with the aim "to create a community where people learn, think and act together towards realising a sustainable society". With a diverse participant base of over 240 organisations--including community learning centres ("kominkans"), schools, universities and non-governmental organisations (NGOs)-this initiative has administered numerous programmes…. the important role which social learning has played in Okayama City's transition to sustainability and identifies the key efforts made to address and link each of these elements of social learning into a dynamic cycle. (Didham et al., 2017)

6 Fifth loop and spiral – Information literacy, STEAM, ELSI, SDGs, labor and employment

Real life jobs need interdisciplinary skills and educations should be adjusted in a way that students obtain these skills in their education lives (Tuncay, 2019). For example, STEAM subjects--science, technology, engineering, art, and mathematics-are essential for fostering students' 21st-century skills. STEAM promotes critical-thinking skills, including analysis, assessment, categorization, classification, interpretation, justification, and prediction, and are enhanced through the integration of subjects. At the elementary level, teachers have inherently integrated STEAM, compared to their secondary-level counterparts. (Roy, 2016). In STEAM instruction, inquiry and authentic problem solving connect the disciplines to encourage higher-order thinking and increase student engagement. Being observed and (evaluated) through a rubric that reflects various components of STEAM instruction (methods) while implementing (the lesson plan or) the lesson.

Then transcripts from these lessons were coded to identify the types of questions teachers asked. (Jacques et al., 2020)

However, the development of the STEAM discipline has placed demands on the competencies of educators. Drawing partly on publicly accessible commentary on 2015 Programme for International Students Assessment (PISA) scores (Organisation for Economic Cooperation Development, [OECD], 2016), this reminds educators of the need to reflect on past, present, and possible future interventions and strategies to help "all" students be academically successful. It is discussed how a STEM/STEAM-based 21st century skills framework can have a positive impact on student achievement by creating an engaging, challenging, rigorous, student-centered teaching and learning environment. The importance is stressed of taking a unified ecological approach involving home, school, and community settings when attempting to understand how and why students have been academically successful, and conversely unsuccessful. (Worthington, 2019). STEAM education and Design Thinking are both models for interdisciplinary collaboration and problem solving to foster economic innovation, develop 21st-century skills and entrepreneurial literacy (Graham, 2020).

We also need to provide appropriate teaching and learning methods to help teachers integrate and help students succeed. The potential is explored Hawari & Noor, 2020) of Project-Based Learning (PBL) approach in a multidisciplinary art classroom involving STEAM (Science, Technology, Engineering, Art, and Mathematics) education. The PBL approach involves a dynamic classroom approach, which emphasises on long-term learning, interdisciplinary and student-centred art activities. This implementation would benefit the teaching strategies in art projects; helping students understand lessons, improving communication and soft skills, as we ll as enhancing leadership skills and creativity. (Hawari & Noor, 2020) For example, "Family Secrets," a problem-based learning (PBL) curriculum module that focuses on the bioethical implications of genetic testing. Students are using "Family Secrets" to learn about DNA testing; Huntington's disease (HD); and the ethical, legal, and social implications (ELSI) of genetic testing. Moreover, this article also discusses a five-part progressive disclosure PBL that includes: a family disease; the dilemma; a difficult choice; testing for the HD gene; and making decisions. Furthermore, some teachers reported that the module inspired them to create additional PBLs on topics such as ecology, evolution, and genetic engineering. (Markowitz et al., 2006)

Since the 1990s, Information Literacy (The ability to access, evaluate, and use information from a variety of sources) has been proposed as a general framework for information utilization skills. Besides, learning from Leadership Responsibility, bold regulatory reforms (e.g., correspondence high schools, college admissions, etc.) have led to the development of Career Readiness (a variable construct that describes the knowledge, skills, and attitudes needed to

secure and maintain well-paying employment). It is hoped that attempts will be made to improve job performance (the degree to which employees and trainees accomplish job-related tasks and skills - sometimes referring to specific skills, sometimes referring to overall performance - also used for factors related to success or failure in a work situation), job skills, and develop them into Employability or Employment Potential.

7 Conclusion - towards 21st century skills 2.0

As part of the globalization process, it is important to promote Education for Sustainable Development. Both "shallow ESD" and "deep ESD" exist. The former stems mainly from widely shared interpretations of ESD that emphasize the overlap and connections with existing school subjects and types of education. The latter is needed to avoid this loss of dynamism and to gain access to the full potential of ESD. Holistic educational approaches that replace conventional ones, as well as system-level transformation, are indispensable to realize this "deep ESD." (Nagata, 2017). STEAM education can provide more directions for this transformation.

Moreover, as a consequence to the COVID-19 crisis, the unforeseen spread of COVID-19 compelled educational institutions to deliver classes in a flexible modality and explore alternatives that could assist instruction in a non-face-to-face modality. This abrupt change necessitates major shifts in assessment culture and adds another dimension in the assessment practices of teachers in higher STEAM education. Universities and higher education alike face massive challenges concerning how to operate efficiently in the so called 'new normal,' including assessing learning. Furthermore, the immediate demand for flexible learning, directed teachers to hurriedly alter their practices, accountabilities, and assessment routines. Educational sectors in many parts of the world strategize on how account teaching and learning through meaningful assessment practices during the pandemic to conduct evaluation, provide feedback, and offer formative guidance to students in a flexible learning scenario. These rapid changes require assessment practices of teachers to presume that they have already established particular competencies and digital technology know-how. … STEAM teachers to function in various learning environments, especially in a flexible one. …. Such assessments may be crutial in apprising learning process, how to proceed with instruction, and boosting the learning of those who lag behind because of the crisis. and this necessitates us to prepare in advance and depending on the strategies to flexible learning and may need to conceptualize and utilize modifications on assessment structures (Sarmiento et al., 2020).

The potential of Project-Based Learning (PBL) approach is explored in a multidisciplinary art classroom involving STEAM (Science, Technology, Engineering, Art, and Mathematics) education. The PBL approach involves a dynamic classroom approach, which emphasises on long-term

learning, interdisciplinary and student-centred art activities….The PBL pedagogical design has the ability to improve teaching strategies and with potential to replace a traditional, teacher-led art classroom. The approach is effective in guiding teachers to manoeuvre an authentic art lesson while benefiting the students through emphasis on the artistic process of creating a STEAM project, while focusing on culminating the necessary art content through active collaboration, exploration of real-world challenges and curricular activities' problem-solving. (Hawari et al., 2020)

When STEAM is introducing in the context of Japan, the possibility of an approach based on assessment and pedagogy of knowledge expansion with "geo-stream (Geology, Geography - Science, Technology, Reading/Robotics, Engineering, Arts, and Mathematics) as the core from the history of curriculum will be pursued.

In addition, skill development or self-management deliberate the use of learned strategies to maintain or modify one's own attitudes and actions: such strategies include goal setting, self-monitoring, self-correcting, and self-solicitation of feedback "in a multi-layered way with multiple feedback" (Howe & Arimoto, 2014). Words like synergy, feedback, causal loops, symbiosis are now becoming part of our language as our thinking is changing dramatically (Thayer-Bacon, 2003, p.166).

Until 1970s, Western and Japanese experts believed that almost all Japanese or Asian cultural characteristics were remnants of their feudal past. It was thought that convergence was inevitable and that Japanese methods of communication would become more and more like those of the United States. However, we are not so sure now. Many examples of Japanese companies abroad seem to show, on the contrary, that Japanese communication values are also universal. If there is convergence, it also means that the West is as receptive to Eastern values as Japan has been to the West. (Itoh, 1991).

Here the matter is organizational culture, which leads us to SECI model. With empathy as the key, Japanese-style educational management will be reintegrated within SECI (socialization, externalization, combination, and internalization) model and reframed in a "dual-purpose in a multi-layered way with *multiple feedback* framework", from closed (principle of) self-sufficiency (*Jimae-shugi*) to open innovation and spontaneity which relate to curiosity as Personality Traits (open-mindedness, exploration, openness to experience, passion, self-direction, motivation, initiative, drive, enthusiasm, wonder, appreciation. There is some related articles. Problem-based learning approach guided by the SECI framework (socialisation, externalisation, combination, internalisation) can help in-service teachers to cultivate technological literacy and technological pedagogical content knowledge (TPACK). Teachers may have to reevaluate their teaching practices and to rethink the nature of the subject that they teach (Tee & Lee, 2011). The influence of the knowledge transfer is analysed through the implementation of information

technology comprising variables like socialization, externalization, combination, and internalization (SECI) and reflected in the performance of the headmasters at state high schools and state vocational high schools in Indonesia (Putra, 2020).

We will inherit the characteristics and essence of Japanese management, overcome the constraints and learn from overseas, and boldly innovate through skills. For knowledge creation in the workplace for workplace literacy, we see the similarity between SECI model and Organizational Learning.

While maintaining the importance of character education, we must also maintain equity and Collegiality (Relationship among people within a profession, field, organization, or office, characterized by trust, openness, concern, and cooperation), Cooperation (Act of working together toward a common goal). In particular, the importance of Teamwork can also be read as Team Learning, which is related to these five disciplines: (1)A shared Vision (second loop), (2)Mental Models (fourth and fifth loop), (3)Team Learning (first, second and third loop), (4)Personal Mastery (second loop) and (5)Systems (first, second, third, fourth and fifth loop). System Thinking is the one *discipline* that binds the other four and therefore the *discipline* where the focus of Change Management should be.

Here "lesson study" is incorporated into SECI model, which is an Japanese approach of *Jugyou Kaizen* (improving teaching), which emphasize what actually goes on in the classroom and how the quality of teaching can be improved, has become an alternative model of core innovation of school education and improving teaching-learning process in the world (Sakar Arani & Fukaya, 2009).

We notice cumulative culture of school organization culture, or culture osmosis which is a story about identity. In sociology, habitus comprises socially ingrained habits, skills and dispositions. It is the way that individuals perceive the social world around them and react to it. These dispositions are usually shared by people with similar backgrounds (such as social class, religion, education and profession).

However, in Japan behaviourist learning theories and constructivist assessment easily coexist in Japanese internal accountability. In the form of Amalgam-Composite hybrid School research theme (SRT) school-wide endeavor as a symbol of school organizational *kata* and dual-thinking culture coexist. This SRT can be achieved both top down ("*tatemae*"), through official policy documents, and through daily cultural practices ("*honne*") using the common language of the school-based professional learning community (SBPLC) behind the scenes of lesson study (Shimojima & Arimoto, 2017).

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【Note】

1) see: Montgomery, W. A. (1919). Educational Conditions in Japan. Bulletin, 1919, No. 57.

2) The incorporation of the Lean Philosophy in PCMS will be carried out through Kaizen. "Kaizen" is a Japanese word which means "change for better". It is a step wise process which is carried out with the involvement of all the skills and stakeholders. So, for PCMS advancements, it involves all the skill and stakeholders which are related to PCMS. Following is the summary of the Kaizen: (Patty and Denton 2010b). Preparation for Kaizen involves identifying work process problems, or opportunity to improve; measurement and estimating the value of closing the gap between what is and what should be. Teams should summarize their findings in 'situations-at-a glance' and identify skill and stakeholders, principles and methods for solution development and implementation A Kaizen is a workshop, to develop the solution of the work process problem with the involvement of all the skills and stakeholders, and the application of rapid improvement principles and methods. Once solutions are developed, Kaizen teams validate and refine the solution through trystorming and Piloting. If the desired solution is not achieved, the process is repeated again and again until the desired best solution is achieved and standardized. After successful piloting these improvements are built into company standards, management by standards must be embedded in the culture and governance of the organization. Following important consideration is highly dependent on the work by Patty and Denton
   - Abolishment of the culture of already knowing and cordial hypocrisy
   - Motivation and encouragement for the executives or senior management to engage the skills and stakeholders to participate in the Kaizen process – in recognition that to be successful, all stakeholders must win.
   - Alignment and whole hearted participation of everyone throughout the process
   - Relentless implementation of the whole Kaizen process and willingness to repeat it again and again
   - Knowledge and understanding of the "Lean principles"
   - Involvement of Kaizen/Lean experts to facilitate the process

3) From 1994-95 the Case Study Project (a component of the Third International Mathematics and Science Study) collected information from interviews with students, parents, teachers, school administrators, and education officials, as well as through classroom observation. Topics investigated in the Case Study Project were education standards, dealing with differences in ability, the place of school in adolescents' lives, and the training and working conditions of teachers. The project examined elementary, middle, and high schools in the northern, middle, and southern parts of Japan. Specifically, the study sections are: (1) "Introduction" (Gerald LeTendre); (2) "Development and implementation of education standards in Japan" (Douglas Trelfa); (3) "Individual differences and the Japanese education system" (Hidetada Shimizu); (4) "The role of school in Japanese adolescents' lives" (Gerald LeTendre); (5) "Teachers and the teaching profession in Japan" (Carol Kinney). Within that broad framework some issues that were addressed include the effects of a unified curriculum, teacher work patterns,

the role of schooling in social stratification, individual differences and concepts of ability, the role of the family, and foundations in preschool and elementary education.

4) The ELSI mentioned earlier refers to Ethical, Legal, and Social Implications research, which is playing an increasingly important role in scientific research. Tens of millions of dollars, many of which are public, are spent funding scientific research projects. Taxpayers are demanding that scientific advancement move forward, hand-in-hand with careful examination of the many ethical and social issues that are raised by the emerging sciences. It is not uncommon to find grants that include ELSI components. This raises a potential problem relating to the ability of ethicists to undertake serious, objective reflection and make independent, normative suggestions (Seltzer, 2011).

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【Further readings on 21st century skills】

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21世紀型スキルとナレッジマネジメントの日本的経営と学校組織文化への導入

―2011年以降東北が提供できる21世紀型スキル2.0に向けて―

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日本の初等・中等教育における21世紀型スキルは，複合的な要素で構成されており，不確かな層を持つ5つの多層ループである。日本では，第1，第2のループによる伝統的な学習方法と，第3～5のループによる21世紀に求められるスキルを融合させ，全人教育に力を入れている。1つ目のループは，日本語でいえば，素直さ，自己内省，改善，自己学習能力であり，2つ目のループは，日本的な基礎基本，日本的な経営の良さであるハーモニー，内輪で取り仕切る，ボトムアップ型の意思決定プロセスの活用に支えられている。個人に焦点を当て，個人の違いに対応することは，この四半世紀の間に変化してきた。共感をキーにして，日本的な教育経営はSECI（社会化，外在化，結合，内在化）モデルに再統合され，閉鎖的な自前主義からオープン・イノベーションへと，「複数のフィードバックを伴う多層的な方法での二重目的」の枠組みに再構築される。

キーワード：21世紀型スキル，日本語による対人関係コンピテンシー，構成主義的アセスメント，日本の組織文化，型文化の象徴としての学校研究主題